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ZOE

A BIOLOGICAL JOURNAL.

VOL. I. APRIL, 1890. No. 2.

THE ECONOMY OF NATURE AS EXEMPLIFIED BY VEGETABLE AND ANIMAL PARASITES.

BY H. H. BEHR.

The ancients, by a kind of intuition or instinctive knowledge of the general fitness of things, expressed their admiration of the universe by the phrase "the harmony of the spheres," and some even went so far as to believe in strains of music produced by the rotation of celestial bodies. It has since been proved that mathematical laws govern the infinite space. We leave the study of those laws to the astronomer and restrict our attention to the beautiful harmony that rules the organic creations peopling our earth.

We see here first the antagonism between animal and vegetable life, and observe at the same time that each is necessary to the existence of the other. As there is no shadow without light and *vice versa*, so no animal life can exist without plant, no vegetable life without animal. We see animal and plant by their respiring process absorb oxygen and secrete dioxide of carbon. We observe that, with the sole exception of those plants entirely destitute of chlorophyll, an opposite process takes place in the nutrition of the plant, by which it absorbs the carbon of the dioxide and sets the oxygen free. As this process of nutrition is considerably more active than the exceedingly slow one of vegetable respiration, practically the plant secretes oxygen and absorbs carbon.

Any aquarium illustrates this natural dependence of animal and plant. Practically the experiment could be made in a very simple way with two glass globes containing gold fish. If there are introduced into one some rooting branches of watercress it will be seen that the water keeps fresh and respirable to the fish, the watercress secreting the supply of oxygen necessary to sustain animal respiration and absorbing the carbon from the dioxide of carbon

produced by the respiration of the fish and using it for its own growth.

The globe that contains fish without watercress soon must have its water renewed or the fish will die by gradual suffocation.

Something similar will take place if watercress is placed in a third globe without fish. The watercress will wither amid a slimy matter. This slimy matter is, it is true, also of vegetable origin. It belongs to the group of Thallophytes whose biological conditions do not require a considerable amount of carbon, and which adapt themselves very well to the surplus of oxygen that, during the short time the watercress sustains its biological processes, is secreted by its growth. If the first globe is exposed to the sunlight, the wholesome state of the water, and with it the equilibrium between animal and plant life, may be kept up for a considerable time without renewing the water.

We see that the existence of both primary forms of organic life is a biological law. But now a great many complications arise by a network of cause and effect that connects not only the two fundamentally different types of organic life, that is, animal and plant, but also animal and animal, plant and plant. To give an idea of the long chain of causes that produce certain phenomena I will first remind you of the phenomenon quoted by that most talented observer, Darwin, when in a certain district the destruction of cats caused the disappearance of the wild pansies occupying before a prominent place among the agricultural weeds of the locality. The field mice multiplied considerably; they ate the young brood of the hornet and bumble bee and destroyed their nests. Now the pansy belongs to those plants that rarely, or never, produce perfect seeds without the agency of these insects in carrying the pollen to the stigma of the flower. No new plants sprang up, the fecundating insects having disappeared, and the old plants gradually died out. Now you see the removal of the cat caused the dying out of the pansy.

I can give here an instance of a similar concatenation of efforts that caused the defoliation of our live oak, *Quercus agrifolia*. There exists around our bay a moth, *Phryganidia Californica*, which moth lives exclusively on live oak, though I lately have found some stray larvæ on *Q. lobata*. When, in 1853, I first found the caterpillar of this species, I considered it a great prize, so rare was

the little thing. Gradually the insect became less rare, and as soon as a sufficient number of shotguns were placed in the hands of little boys who shot little birds, I had ample opportunities to fill the empty spot in my collection that for several years had only the male of the species on a pin.

I have counted four generations of the insect in one summer. Nevertheless they did not endanger the life of the trees inhabited by them. There existed still a sufficient number of insect-feeding birds to decimate the four broods of the insect, especially a species of titmouse, then rather common in our surroundings and very frequent in Marin county, took care of the eggs and the adult caterpillar. This bird managed in some way to escape destruction by the shotgun, but then the English sparrow was introduced by some well-meaning but imperfectly instructed people. The sparrow soon drove away the titmouse. The titmouse no more decimated the Phryganidia egg and larva, at both of which the sparrow looked with a contemptuous smile. The Phryganidia multiplied in mathematical progression; the leaves of the live oaks, for instance at San Rafael, disappeared four times a summer; some trees survived, others succumbed; and so you see the introduction of the English sparrow destroyed our Californian live oaks. The best proof that the English sparrow was the cause of this destruction is the circumstance that the destruction coincides with the spreading of the sparrow. The sparrow being an admirer of human civilization, never moves from the neighborhood of cities as long as he can help, but extends baneful influence on the rest of the birds, unfortunately, over a more considerable area than that which he really occupies himself.

The phenomena referred to show very clearly that an interference in any province of biology does not remain a single interference, but like a stone thrown into a pond raises circles of disturbance extending farther and farther, till at last nature restores a state of things more or less like the one that was suspended by the original interference.

The same state of things never returns, because nature never copies herself; she is progressive. Changes are constantly going on in the form of slow development. If I say slow development of course I speak from my own standpoint, or better, from the standpoint of our race, because nature does not know the ideas of slow and rapid, because the universe knows neither space nor time.

Taking human reasoning as a standpoint, the gradual organic development has different standards; first, the daily growth of plant and animal; second, a yearly periodicity depending on the solar cycle, and third, secular changes which become perceptible to us only by changes in historical landscapes or the underground remains of plant and animal now superseded by a different vegetation, inhabited by different animals. Rapid changes or disturbances in organic life are exceptions, and even in prehistoric times may not have been so frequent as we are now disposed to think, and probably have more usually taken the form of gradual developments.

It would lead too far to discuss all the different forms of such disturbances that have occurred or may occur. We will only discuss the one to which considerable practical interest is attached in regard to cultivated land, that is, the multiplication of certain forms of organic life frequently injurious to our plantations, herds, or even ourselves, whether the form multiplied out of proportion be animal or plant. One of the most frequent causes of such disturbance is man himself, but even without his interference, a combination of circumstances produces occasionally such disturbances in districts little or not at all interfered with by man; for instance in the Arctic the wanderings of the lemming, a kind of gopher or rat, or, what is of more practical interest, the migrations of different kinds of grasshoppers in our own temperate zone.

Almost all disturbances of the equilibrium in nature are more or less undesirable, and to prevent their frequent occurrences, to restrict and repair the damages inflicted by them to human interests, is one of the most noble problems of science. To accomplish such object it is necessary to study the phenomenon where it takes its course without human interference, because the less complicated phenomenon is more likely to reveal to us its causes and show to us the ways and means applied by nature itself to restore the endangered balance of power. Thus it is necessary to study the single case of disturbance first in its isolation, then by comparing it to analogous cases in which human agency is as little apparent as possible.

This study will make us acquainted: first, with the cause or the combination of causes that produced the inordinate multiplication of plant or animal, so that it became a pest; second,

the means applied by nature herself to restore the equilibrium, in other words to counteract the harm resulting from an inordinate prevalence of the injurious species. These means we have to imitate, as far as an imitation of them is in our power, and carefully abstain from producing new disturbances by the use of violent remedies, because the history of these experiments, where it dates farther back than in our own country, has demonstrated that the benefit derived from violent interference is of short duration, and even then frequently of a very questionable nature, and that a series of other disturbances is always the result. I quote here a historical example:

At the beginning of this century the orchards of Normandy, Belgium and other districts of Northern Europe were afflicted by a kind of Psylla. As cider is one of the staple products of that region the matter excited considerable attention, and a wash, chiefly containing lye, was applied, and proved a perfect success. The next year the grain fields suffered considerably from the green aphis, which, as it was a warm and moist summer was imputed to that circumstance, but as the aphis increased for two years independently of the weather, and the apple trees became infested also by different kinds of borers more than ever before, the scientists at the universities of the different countries were consulted, and their investigations proved that the application of the lye had killed, besides the Psylla, the Coccinella and other enemies of the injurious insect, had driven away the insect-feeding birds, and in this way facilitated the multiplication not only of the insect-feeding parasites of the apple tree, but of insects injurious to vegetation in general.

I am glad to see that our biological authorities begin to follow the advice given by nature, and introduce insects of the Coccinella tribe from Australia. This of course would not have been necessary if they had protected our native species, formerly common and now very rare. I think it not out of place to warn our horticulturists not to combine the two systems and treat the Australian newcomers to a course of washes, or else a new expedition to Australia may become necessary.

THE FISHES OF THE YELLOWSTONE PARK.

BY DAVID S. JORDAN.

Not long ago the writer was directed by the U. S. Fish Commissioner, Hon. Marshall McDonald, to make an examination of the streams of the Yellowstone Park, with a view to finding the distribution of the species of fishes there, and also to give direction to the work of stocking the streams with trout and grayling.

In September last, the writer, assisted by Dr. Charles H. Gilbert, spent three weeks in such explorations. A few of the facts ascertained are given in this paper.

The Park region is an elevated plateau of lava, traversed by many clear mountain streams, and with a number of large lakes of glacial origin.

On all sides of the plateau, excepting the southeast, wherever the streams leave the lava-plateau they have cut deep cañons, and at the head of each cañon there is a waterfall. These falls vary in height and steepness, the highest being the vertical fall of the Yellowstone, but almost all of them constitute an impassable barrier to the ascent of fishes.

The original lava flow, which dates from Tertiary times was, of course, fatal to all life in this region. If the fishes ever invaded the region after the suface of the lava became cold, the snows of the glacial period must have again driven them out. Since the glacial period the formation of falls and cañons have effectually prevented their return, except in a few cases noted below.

It has thus resulted that a territory of 1,500 square miles, nearly half the area of the Park, is wholly destitute of fish. This comprises the drainage of the Gardiner, Gibbon, Fire-hole, Nez Perce, Tower and Lewis rivers, with Shoshone and Lewis lakes. Among these are some of the clearest and coldest streams of the Rocky Mountains, streams in every way suitable for the maintenance of trout. If the popular idea that each species of animal has been placed in those regions most suitable for its development be correct, the failure to fill these streams with fish must be regarded as a great oversight on the part of Mother Nature. Besides this fishless area within the Park, there is another perhaps equally large, further east, on Clarke's Fork of the Yellowstone. In all these streams they are placing trout and grayling, and it is the intention

of Commissioner McDonald to give to each drainage basin a different kind of trout. If these trout do well, and there can be little doubt that they will thrive, the Park will become the most attractive trout-preserve in the world.

In the largest stream in the Park, the Yellowstone, trout exist in abundance, both above, below and between the falls. Above the falls in the river, and in Yellowstone Lake, no other species of fish are found.

The reason for this anomaly of distribution is to be found in the character of the Continental Divide at the head of the Yellowstone. At a point called "Two-Ocean Pass," Atlantic Creek, a tributary of the Snake River, come within less than a quarter of a mile of each other. This interspace, the "Two-Ocean Pass," is occupied by marshy meadow, which is covered with water for a time in the spring. Across this pass the trout of the Upper Yellowstone must have come. As no fish except trout ascend Pacific Creek from Snake River, it is natural that no other species should be in the Upper Yellowstone River or in the Lake.

There is good evidence that the interval between the two falls of the Yellowstone has been stocked by fish from above. Whether the Lower Yellowstone, with the Madison River and other tributaries of the Missouri were stocked through Two-Ocean Pass, is an unsettled question. Few, if any, trout could go safely over the lower fall of the Yellowstone (about 300 feet).

In a stream called Lava Creek, which flows into Gardiner River, a tributary of the Yellowstone, a few trout have been seen above its waterfall. We find that one of the branches of Lava Creek heads in the same depression with one of the forks of the stream next east of it, the Black-tail Deer Creek. The Black-tail Deer flows into the Yellowstone without a waterfall, and it is well stocked with trout. The watershed between the two streams is at one place reduced to about three rods of meadow, elevated less than two feet above the bed of the tributary of Lava Creek.

In the spring this meadow must form a continuous pond through which fish can cross from one stream to another.

In the Gibbon River, above the high fall which is wholly impassable to fishes, the "Blob," or "Miller's Thumb," a little-bottom fish, is very abundant. This fish is especially fond of ascending springs,

and in Elk Park, on Gibbon River, we found the remains of three individuals which had been boiled in attempting to ascend a spring of hot water.

There is no certain explanation of the presence of the Blob above the Gibbon Falls. The most plausible supposition is this: The Osprey is abundant about the river. A trout caught by the Osprey would die in the air, and could not be dropped alive into the other waters. The tougher Blob so transported might fall into the stream above the falls and survive the journey.

In no stream other than the three mentioned (Yellowstone, Lava and Gibbon) is any fish-life to be found above the falls. In the large and beautiful lakes, Shoshone and Lewis, there are no fishes whatever.

The following are the species of fishes found by us in the Park:

1. In the north and northeast (Yellowstone Drainage).
   Salmo mykiss Walbaum. The TROUT.
   Catostomus griseus (Girard). The SUCKER.
   Rhinichthys dulcis (Girard). The MINNOW.
2. In the northwest (Madison River Drainage).
   Salmo mykiss. The TROUT.
   Coregonus williamsoni Girard (var.) The WHITEFISH.
   Thymallus signifer ontariensis Cuv. & Val. The GRAYLING.
   Cottus bairdi punctulatus (Gill). The BLOB.
3. In the south and southwest (Snake River Drainage).
   Salmo mykiss. The TROUT.
   Catostomus dæmonoleptus Jordan. The WITCH CREEK SUCKER.
   Leuciscus cæruleus* (Girard). The CHUB.
   Leuciscus hodrophlox (Cope). The SHINER.
   Algosia nubila (Girard). The MINNOW.

*The genus *Leuciscus* Cuvier, based on several European Cyprinoids, was first restricted by Agassiz and Bonaparte to *Cyprinus leuciscus* L. It is therefore identical with the genus *Squalius* of Bonaparte.

THE EFFECT OF RAIN ON FOUQUIERIA.

BY T. S. BRANDEGEE.

The growth of plants in Southern Lower California, and their production of leaves, flowers and fruits depend upon the time of the rains and their amount. Sometimes in seasons of slight fall the whole country becomes parched, and only one tree, known to the

natives as "Palo de San Juan," or St. John's tree, the systematic position of which in botany is yet unknown, holds its leaves and remains green.

The large extent of country between Magdalena Bay and La Paz is mostly covered with cactus and bushes ten feet or less in height, the most common of these bushes being *Fouquieria spinosa*, known to the natives as "Palo de Adam," and *Jatropha canescens*. These two species were leafless in the early part of January, and their preponderance gave to the region an unusually dry and barren appearance, but the occurrence of a rainstorm almost immediately changed the face of the country. Fouquieria put out leaves at once, and a few days later was covered with foliage. The broader leaves of Jatropha appeared soon after, and grew rapidly. Fouquieria seems to lose its leaves quickly, and I was told that every rainstorm produced a new set, so that it necessarily goes through this process several times during the year.

A MONŒCIOUS WILLOW.

BY C. L. ANDERSON.

The willows being, as has been said, the *bête noir* of botanists, we may expect many strange freaks in that family. I find it necessary to live with them from year to year before they can be known. Living with a grove of them at my back door I have become somewhat familiar with some half a dozen species.

Botanists say they are diœcious; and so they are, as a rule. I have however in my back lot an exception. It is monœcious bearing both staminate and pistillate flowers on the same catkin.

This particular willow is not uncommon among these trees in this locality, and has each spring given me some anxiety because I had no name for it. For a time I considered it a form of *Salix lasiandra* very near the typical. But finding several trees with male and female flowers on the same ament I have come to a different conclusion.

In the early settlement of this locality by the missionaries *Salix Babylonica* (weeping willow) was introduced and there are many fine large trees in existence now. They are all pistillate as far as I have examined. I feel quite sure that my monœcious willow is a hybrid of *S. Babylonica* and *S. lasiandra*. The trees have the

weeping habit, so that in some cases they are hardly distinguishable from the genuine weeping willow; but in other cases they come very near *S. lasiandra.*

It does not seem strange that we should have a monœcious hybrid of diœcious trees. The strangeness is that we do not always have them. But among the willows I have never noticed such a result before.

NESTING HABITS OF THE GOLDEN EAGLE.

BY H. R. TAYLOR.

On February 20, 1889, I received the following telegram, to me perfectly intelligible: "Come to Sargents to-morrow; the eagles are early." This was somewhat of a surprise, as I had regarded a set of the golden eagle's eggs taken on February 29, 1888, as an early laying. Plainly the last three weeks of pleasant weather had made the nesting season early. It is almost needless to say I packed up hastily and was off for the eagle territory the following morning. On arrival I met my friend B. at the station, and started off to visit an eagle's nest which I found last year.

On arriving in sight of the eagle's nest, which was in a rather small live-oak near a road, we saw the male perched on a fence not one hundred yards from the tree. When we came near he flew, passing close to the nest, from which the female followed a few moments later.

It did not take us long to climb the tree, when we were delighted to find two eggs, handsomely marked. The nest was only thirty feet from the ground, and was not a large one, being three feet in diameter, by eighteen inches in thickness. It was constructed of oak sticks, poison-oak branches and sage brush; lined with green and dry oak leaves and grass, with a sprig of the bright-red *Toyon* berries. Before reaching my friend's house, several miles distant, we visited an old eagle's nest, which was in an oak about fifty feet above the ground. It was a very bulky affair, formed of big oak sticks, mustard stalks and pieces of grain sacks. The lining was of Spanish moss and oak leaves. When we rode under the tree we saw the great bird's tail projecting over the edge. She perceived us soon and flew off, when we made the ascent and found one egg, brightly marked with brown and lilac.

My friend returned some days later for the eggs, and finding the female again on the nest, on climbing up grasped her by the tail, thinking to secure some feathers as well. The bird turned upon him angrily, doubtless mistaking him for a coon or wildcat, and not until beaten off with his hat did she discover the mistake and take flight.

The only eagle breeding in Santa Clara and San Benito Counties, so far as observed by me, is the golden eagle (*Aquila chrysaetos*). The bald eagle (*Haliæetus leucocephalus*) nests, I am told, in Monterey County; also, in Alameda County. The golden eagle usually chooses an open tree for its nest. The setting bird is said to leave the eggs uncovered for several hours after 12 M. on sunny days, while it takes recreation in flying with its mate. I have never investigated this fact, although once on a warm day I saw an eagle fly to its nest about three o'clock. They become attached to their old homes, and if not disturbed, refit them for occupancy every year, increasing their bulk sometimes to immense proportions. When robbed they still cling to the locality, commonly building a new nest within three hundred yards of the old one, although frequently they return again trustingly to their old home. If robbed again at a new location they are pretty certain to go back to the old nest the following year, but when there are two nests in the same tree, as frequently happens, the persecuted eagles only remove to their first nest, fancying that on another limb they will be safe from disturbance.

After several years' study of these eagles, the writer feels that he has formed the acquaintance of a number of individuals of this species, and this purely from the regularity of their habits. The first eagle I ever saw in Santa Clara County was moving about the grassy top of a big hill, and on nearly every day thereafter I observed him at his favorite play-ground. On my visit the year following he was still doing "look-out duty" at his old post. The nest of this eagle had a curious ornament to the interior in the shape of a large "soap-root." The new nest, built the year after, also contained a soap-root, which fact is of interest, as showing the individuality of my feathered friend. Another eagle I know has a singular predilection, when nest-building, for grain sacks, which it uses chiefly in the lining. When I first discovered this eagle's nest, there was one of these large sacks inside. The heavy storms of the next winter dislodged its nest, and in the new one it built I was sur-

prised and interested to observe a grain sack. The set of two eggs taken from this nest were unusually large, one of them measuring 79x62.2 millimeters.

A curious circumstance about the eagles that make their home near Sargents is that several pairs that are always seen there apparently do not nest. The nature of the country in some of the hills is such that one accustomed to riding about might actually know every tree where the birds could build, so that an undiscovered nest would be an impossibility. My friend showed me a pair of eagles that have lived in the hills just back of his house for many years. He also pointed out to me their nest, which the eagles repaired last year, but did not use. He says they have not layed since 1884, when they had three eggs. This pair stay about the place all the year, living largely (like the other eagles thereabouts) on squirrels. They are accustomed to roost in one particular tree. I heard them uttering their peculiar, plaintive whistle in the mornings several times during my stay. Their nest was not much over three hundred yards from the house, and was a large structure built on a horizontal limb about forty feet from the ground.

From what has been said it will be seen that collecting eagle's eggs in California is not fraught with the difficulties and dangers which confront the ambitious egg-hunter in the Eastern States. One eagle's nest I found was so accessible that a lady could have climbed to it almost without difficulty.

BIRDS NEW OR RARE IN CALIFORNIA.

BY W. OTTO EMERSON.

During the past ten years of my collecting experiences in California I have added some species which are new to the avifauna of the state or of rare occurrence; these are

Spinus psaltria arizonæ. Arizona Goldfinch.—A male was taken in a garden at Haywards, January 10, 1883. This variety of goldfinch is apt to be overlooked from the fact of its associating with others of the same genus during the winter months. A male is mentioned by Dr. Cooper as being seen May 7, 1872, at Encinitas Ranch, thirty miles north of San Diego, feeding on wild sunflowers: also another near San Buenaventura, January, 1873.

Ammodramus sandwichensis savanna. Savanna Sparrow.—This rare straggler was shot at an elevation of 5000 feet in the Volcan Mountains, San Diego County, March 9, 1884. It was the only bird of this genus seen. It was sent to Mr. Robert Ridgeway for identification and returned as being this form. (No. 205, ♀, coll. W. O. E.)

[This bird was recorded as *A. s. alaudinus* in Bull. Cal. Acad. Sci., II, No. 7, p. 422.—W. E. B.]

Zonotrichia albicollis. White-throated Sparrow.—I am quite sure that I saw one of this species at different times between January 2 and 14, 1889, about the door yard, feeding upon crumbs swept out. On trying to shoot it I missed several times, when the bird left the flock of golden-crowned sparrows with which it was associated. The female which was taken was first observed in the yard, November 18, 1889, with golden-crowned sparrows. I did not succeed in getting her this day, but on the 20th this straggler was secured.

This species has not been observed by any of the early explorers on the west coast of North America.

Junco hyemalis. Slate-colored Junco.—My specimen, a female, was caught with several Oregon juncos in a quail trap set in the garden for small birds, at Haywards, March 20, 1880. Others have been taken in different parts of California. Mr. W. A. Jeffries mentions one taken at Santa Barbara, March 14, 1883. (*Auk*, July, 1889, p. 221.) Mr. W. W. Price has two males taken at Riverside, February 10 and December 1, 1888.

Melospiza fasciata rufina. Sooty Song Sparrow.—This song sparrow was shot at Haywards, November 23, 1882, from a flock of Gambel's sparrows. (No. 309, ♂, coll. W. O. E.) I supposed it was the rusty song sparrow until Dr. Cooper called my attention to the differences between it and specimens of the rusty in my collection.

This specimen may have been driven southward by the hard storms that occurred in November, 1882. It breeds north of lat. 49° and has not been positively known to have been taken even in winter south of the American boundary; possibly some may inhabit the high mountains of Oregon and Washington in summer.

Setophaga ruticilla. American Redstart.—This species, which I took at Haywards, June 20, 1881, is known for the first time in this state. The bird was a male. Mr. Clark P. Streator informs me that

it breeds within a hundred miles of the boundary at Ashcroft and Duck's Station, B. C. Dr. Cooper mentions this species as one of the seventy-five doubtful west coast birds as likely to occur on the Pacific Coast.

Merula confinis. St. Lucas Robin.—I noticed this light colored form of robin among a large flock of western robins on a hillside feeding on earth worms, Haywards, January 2, 1882. (No. 159, ♀, coll. W. O. E.) My first impression was that I had obtained an albino robin until I compared it with a specimen collected by Mr. Frazar in the Sierra de la Laguna, Lower California. Mr. Geo. B. Badger informs me that he took what he supposed to be this robin at Haywards, March 10, 1880.

[A specimen of the black-throated blue warbler *(D. cærulescens)* and one of the black and white warbler *(M. varia)* which Mr. Emerson collected on the Farallon Islands have been recorded. (Proc. Cal. Acad., 2d Ser. 1, 48.)

Mr. T. E. Slevin collected a white-throated sparrow near San Francisco, December 23, 1888.—W. E. B.]

DEFORMED FLOWERS OF DENDROMECON.

(With Plate 1.)

BY T. S. BRANDEGEE.

Dendromecon rigidum is found nearly throughout California, but most abundantly in the southern part, where it is common and of more luxuriant growth. It was brought by the writer last year from Lake County, from Mt. St. Helena, Alta, Encinitas, Santa Catalina Island, and from Mt. Tamalpais, near San Francisco; and the year before from Santa Cruz and Santa Rosa Islands and the Santa Inez mountains near Santa Barbara.

The form found on the islands is the same on all, and differs from that of the mainland only in its smoother leaves, which usually have the membranous margin entire and are commonly broader. It has received two specific names, the first of which, *D. Harfordii*, is given in the Botany of California as a synonym of *D. rigidum*.

All the mainland forms known to us have rougher leaves with the membranous margin more or less lacerated. The specimens found near Alta, however, approach in this way as well as in breadth of leaves the island forms.

Dendromecon is especially abundant on hillsides sloping up from the sea at Encinitas in San Diego County. It is found there three inches or more in diameter sending up numerous slender stems 6–10 feet high, often drooping in the manner of the taller of the island specimens, to which the name *D. flexile* was applied. On these southern slopes it bears flowers of a size and abundance never seen in northern forms.

The early leaves of Dendromecon, succeeding the linear-acuminate cotyledons, have been seldom noticed. In young plants 1–6 inches high growing in abundance in the loose earth of the steep mountain side at "Cape Horn" above Alta, they were found to be obovate-cuneate in outline with 3–8 rather deep notches.

In some localities, especially at Mt. St. Helena and at Encinitas, the flowers of this plant are subject to a very interesting retrograde metamorphosis. Dense masses of small shoots crowded with depauperate leaves grow from the ends of the branches, bending them down and appearing from a distance like bunches of mistletoe. The flowers in these clusters are all in some degree deformed and often proliferous. In those found at Mt. St. Helena the sepals, petals and pistil are all more or less leaf-like, but the stamens are petaloid. In those from Encinitas however, all the floral parts revert in a greater or less degree to leaves, the axis of the flower is elongated, the sepals becoming two alternate leaves, often separated by a considerable interval; the petals are more nearly approximated; the thickened portion of the axis above bears on its sides the stamens in every gradation from nearly perfect polliniferous ones to leaves; above them arise the two often nearly or quite distinct carpellary leaves which represent the pistil. The axis is often continued between these last, continuing the growth of the shoot and sometimes bearing a second similar flower above.

These deformities of flowers have long been considered of much value as explaining the mode of formation of the more complex organs, and the present one appears to illustrate with a considerable degree of clearness the morphology of simple extrorse quadrilocular stamens.

In this case the leaf is first folded backward with the margins to the midrib, the upper surface outward. The first trace of the anther is shown by a trough-like groove on the fold nearer the margin than the midrib but some distance from either. Although this groove is

apparently a depression of the leaf, it can easily be shown that the folded-in lower surface of the leaf remains flat and the trough is really formed by the elevation of two thick ridges on the outer (upper) surface. The anther cells appear to be formed in the tissue of these ridges, which swell and approximate in pairs, corresponding to the two lobes, the contiguous sides of each pair coalescing at base to form the partition between the cells, which in dehiscence separate from it on either side. The connective is of course the modified midrib and in all these retrograde anthers is prolonged beyond the lobes, making them apiculate instead of as in the normal form, emarginate.

The accompanying figures will make this description more intelligible. Only few forms are shown, but it must be remembered that all gradations from the leaf to the nearly perfect stamen were found.

EXPLANATION OF PLATE.

1. Stamen completely changed into a leaf.
2. Leaf unfolded, showing ridges of anther.
3. Stamen approaching normal form.
4. Perfect stamen.
5. Carpellary leaves representing the style with the continuing shoot drawn through at the side.
6. Cross section of No. 2.
7. Cross section of No. 4.
8. Carpellary leaves of deformed pistil.
9. Perfect pistil.
10. Cross section of No. 3.

THE EUROPEAN DAISY *(Bellis perennis).*

BY FRANK H. VASLIT.

This familiar little plant of our gardens often escapes from cultivation, but seldom succeeds in establishing itself, probably on account of the dryness of our climate.

It seems however to have met suitable conditions in one of the glens of Tamalpais, where it has spread from the vicinity of the old mill on the Throckmorton Ranch for more than a mile up and down the creek, and seems thoroughly established. In the uncultivated state it of course reverts to its normal form, and is not "double" as in the gardens.

Although its white and purple-tipped flowers add considerably to the beauty of the meadows, it is not desirable as an inhabitant of pasture lands.

THE NOMENCLATURE OF FUNGI.

BY H. W. HARKNESS.

The species of fungi brought together in the nine volumes of Saccardo's Sylloge Fungorum number more than 31,000, and being classified very largely by spore-characters, necessitated great changes in arrangement, with the inevitable result of very numerous synonyms. On account of the immense labor and time necessary to a critical revison of the species, very little of such work was attempted, so that the chief value of the publication lies in its bringing together in accessible form descriptions and references to nearly all the species, and the works in which they were published.

The species are probably much less numerous than is generally supposed. The reproductive bodies of most of them are so minute as to be invisible to the naked eye, and therefore widely disseminated by the winds, are apt to be more climatic than geographical in their distribution.

Mycologists are often but slightly acquainted with phanerogamic botany, and are therefore not able to readily judge the degree of relationship of the host plants, which fact is responsible for many synonyms among the parasitic fungi, too many of the forms having received names under the supposition that even if exactly alike, they must be different species if found growing on different hosts. It is, however, well known in the vegetable-feeding insects that while a few are confined to a single species, the majority feed upon all the plants of a genus, or even of a natural family, while a considerable number are almost omnivorous. There is no reason to doubt that a similar state of affairs prevails in parasitic fungi, and that many of these slight differences in size and form which are held to constitute very distinct species are really produced by differences of venation, succulence, etc., of the plants on which they grow.

An attempt has been made by Dr. Farlow, of Cambridge, the highest authority on this subject in America, to furnish a readier means of comparison of presumably related or identical forms, by means of a host index* which, however, has not met with the appreciation it deserves, the average maker of species evidently not relishing any work which tends to cast a doubt upon their validity.

*A Provisional Host-Index of the Fungi of the United States, Part I, Polypetalæ, by W. G. Farlow and A. B. Seymour, Cambridge, 1888.

The chief cause, however, of the synonomy of fungi and the one least understood in other departments of science is the polymorphism of the species. It is probably quite well known to the world at large that such a fungus as the "red rust" of the grain fields often appears under four different forms, three of which are capable of reproducing the species, but it will hardly be believed, and is certainly little to the credit of mycology that these forms, though confessedly belonging to the same species, having all received generic names before their relationship was understood, the form-genera are still kept up, and worse, continually added to. In the Sphæriaceous fungi the relations of the forms not having been so much studied, the matter is still worse, witness the long lists of "new species" of Septoria, Phyllosticta, Glœosporium, etc., which burden the pages of mycological publications.

No one, I think, in the present state of our knowledge, not even the authors themselves, will seriously attempt to justify such a practice which is only excusable, if at all, in the case of some widespread pest which forces itself into such prominence, that a name even if certain to be a synonym has a certain convenience.

The mere publishing of a mass of this kind of names, which already probably amount in the aggregate to nearly one-third of the enumerated genera and species, would do no particular harm, except in the lamentable waste of time involved, if all these names of imperfect forms, specific as well as generic, were certain of retirement as fast as fully identified with their ultimates, but it has been proposed with more or less following, to reckon these imperfect forms in the question of priority, and the possible general adoption of this practice which would unsettle the nomenclature of fungi for something like a century to come, makes it highly undesirable to add to their number.

In the meantime the biological study of fungi offers a field wide enough for all who are likely to be attracted, and in point of interest, and of economic importance the life history of a single fungus, carefully worked out and identified throughout its forms, by observation and cultures is worth far more to mankind than any number of "new species."

[CORRECTION.—In article on Dodecatheon in March number, for "*D. cruciferum*" on pages 18 and 20, read *D. cruciatum*.]

MEXICAN NOTES. I.

BY W. G. WRIGHT.

The city of Mazatlan is built upon a rather low and narrow peninsula running out from the mainland, with the ocean on the north and the "estero" or lagoon on the south. The end of the peninsula consists of two sharp, rocky hills about 300 feet high, while a higher conical island stands just outside, upon the peak of which is a light-house. These high hills cut off the view of the city in great measure from the sight of persons coming from the northward, so that the city is fairly seen only after having rounded the out-lying islands, and reaching the anchorage under the lee of the larger island, and about a mile from the city.

Mazatlan has 16,000 population, and is the second port in Mexico as to value of her commerce—Vera Cruz being first—yet it has no pier or wharf, except a little one at which row-boats land the passengers. All freight is transferred into lighters in the open roadstead. Sometimes storms render it impossible to land either passengers or freight, when they have to be carried and landed on the return trip.

From the ship at anchor a good view of the city is had, and it is a charming scene. A great number of cocoanut trees grace the lower parts of the town, especially toward the estero, where is a plantation of them. The latitude of the place is just about the northern limit of this palm, and though it is not so fine and large as in more southern places, it gives a tropical look to the town. A fine large church is prominent, showing above the low, flat-roofed houses, and on the farther edge of the city is a large building used as a barracks for the few troops which garrison the place. A large, round-topped hill, covered with bushes and thorny jungle forms the background on the left, offering fine airy sites for handsome residences; but such is not Mexican taste, and it is unoccupied, save for a few rows of wretched cabins of poor people along its base. Altogether, to a stranger the view of the city is delightful, and one longs to get on shore to explore the streets, and to view its beauties from every point of vantage.

We reached the anchorage before noon, and at once engaged a row-boat to take us on shore. The balance of the day was taken up in getting through with the formalities of the custom house, and in establishing a new home in the town. I was fortunate in securing

rooms in the airy second story of a house upon "Calle de Olas Altas" the street of high waves — one of the few houses that front directly upon the ocean, where the breezes come cool and clear directly off the water, and drive away all thought of malaria and mosquitoes. The surf keeps up its perpetual thunder just in front of my windows; while from the rear balcony a magnificent view is had of the city, the estero extending southward like a wide river as far as the eye can reach, the outlying forests and foot-hills, and the blue mountains which at a distance of thirty miles rise to an altitude of 4000 to 5000 feet.

The estero is a broad, river-like lagoon which gives an inland passage to boats for sixty miles south, being shut off from the ocean by low sandy islands covered with bushes and thickets. This lagoon is not exactly of stagnant water, yet has but little current from the tides, and none from rivers. With its interlacing swamps and tide-flats and mangrove jungles it affords, I suspect, a fair foothold for fever and malaria in the warmer season. But to the entomologist these features have a pleasant aspect, for those same sandy, flat shores, and tide-flats, and mud-banks bare at low tide,—what homes, these, for tiger beetles and all those other beautiful things that delight the soul of the coleopterist! And how they must multiply in clouds, and fly in countless thousands in such congenial retreats! Blue, red, green, crimson and black, shining like flakes of polished metal, I seem to see them scattering before me in their sparkling beauty, like bits of broken rainbow in the warm sunshine, fleeing from before that unheard-of contrivance, a butterfly net.

The morning after arrival, like most of the succeeding ones, was cold and cloudy; but after awhile the sun came out warm and pleasant. With net in hand I climbed the hills near the outer end of the peninsula, and found a few butterflies, but as it was winter time the flight was not abundant. Nearly all that I caught were strange to me, although resembling forms of familiar appearance. First to be taken was *Agraulis Vanillæ*, then *Heliconia*, *Pyrgus*, *Colias*, *Calephelis*, *Phyciodes*, and others, new and strange, whose generic names I could not even guess at, though none were of the bright, tropical appearance that I had hoped to find, and so I was somewhat disappointed. The plants, too, every one new and strange, yet of ordinary, homely, and even scrubby look, were not so attractive as I had looked for; so I sat down on my plant press

and pondered: "Is this Mexico — this the tropics?" Then I went about and collected a few of the chilled, depauperate flowering plants, that showed no sign of tropical warmth, or even as though they had ever once been comfortably fed; then with net I swept the scanty herbage for beetles, and got only a dozen very small Coccinellidæ that looked very ordinary indeed.

"Blessed be the man who first invented sleep," for a night's rest restored my balance, and after breakfast I struck out for the island side of town. Some acacia trees were in blossom, but no insects were on them. A tall coarsely-flowering bean ran over a small tree, looking very pretty. A big flock of blackbirds nearly as large as crows were all about the roadside bushes. Some gay orioles soon caught my eye; then a large fly-catcher that went screaming with anger into the thicket. A little goatsucker sat on the top rail of a fence in the deep shade of a tree, and I had a mind to catch it in my net for a butterfly. I crossed an old cornfield, the weeds in which gave me a few flowering plants. Then across an open pasture field where some fine cows were feeding; here also I got a few plants in flower. Presently, coming near to a low, wet place, I saw, flying high in air, a large *Scepsis* with white apices and red basal spots; this captured my fancy so much that I waited and walked about the place for two or three hours, getting meanwhile a number of other things, until I had seven or eight of the coveted insects.

I planned that the next day's route should be over on the estero side of town, among the mesquit hedges, and along the bushy side of the tide-water. Here, farther away from the more chilly air of the immediate beach, the air was comparatively warm, and more flowers might be expected. So in the morning I took a street-car through the city, and came out upon the banks of the lagoon to the east of the city. Here, a mile from town, were warm nooks, grassy little arroyos and charming glades, the air odorous with blossoms, and banks and fences over-run with a delicate cucurbit vine, and a small passion vine. A few nimble butterflies flitted about the flowering mesquit trees; these insects were rather small, but some were of bright colors and with new and strange forms like some I have seen from South America. The star-like blossoms of the cucurbit vine I found to be frequented by some of the butterflies, and there was a white flower resembling yarrow upon which I caught a gorgeous metallic-blue tropical butterfly of the *Eudamus* pattern, while upon

the flowers of an unknown tree I caught two of the same style, but with broad tails an inch long.

On my way home I overtook a little Mexican boy who had gathered a basket-full of the fruit of the cucurbit vine. He said that the fruit was good to eat (but then these people will always say "si" to anything you may ask them), and then I asked him if he would sell me some? His eyes danced with delight, and he eagerly said "Si, señor," and I asked how many he would give for "un tlaco," and he hurriedly selected five and offered them to me, whereat I began to be ashamed of myself for leading him to think he would get money, while I had already a pocket-full of the fruit, and did not wish to buy, but only to exercise my Spanish. So I got the copper coin and gave it to him, but declined to take the fruit; but I think that he was so glad to get the money—probably his first coin—that he is to this day ignorant whether he gave me the fruit or not. These fruits I afterward saw sold in the market; they are fed to canaries, but are not used as food by people. The outside is of deep lemon color, roughly verrucose, while the seeds are of a bright cardinal red; altogether a most lovely fruit.

A NEW PERITYLE.

BY T. S. BRANDEGEE.

PERITYLE CUNEATA. Annual, erect 4–7 dm. high, branching above, pubescent and glandular; leaves opposite on the stem, alternate on the branches, broadly obovate, truncate or somewhat cordate at base, irregularly serrate and minutely ciliate, 5–10 cm. long, on slender petioles of variable length; branches few; heads rather large and showy, 6–8 mm. high on slender peduncles 1–3 cm. long; rays yellow, oblong, 3-crenate, 6–8 mm. long, rather numerous; akenes obovate, somewhat cuneate; margin callous often reddened, short hirsute; pappus 2 broad lacerate squamellæ about $\frac{1}{5}$ the length of the akene, and two slender, upward scabrous awns about twice as long as the scales.

Sierra de Laguna near Todos Santos, Baja California, growing in loose soil on the sides of cañons about the base of the mountains. Differing from all the other annual species in its upright growth, the few branches springing from the upper part of the stem. The apex of the akene, and in consequence the pappus, is often oblique.

THE BARRACUDA.

BY CARL. H. EIGENMANN.

The barracuda *(Sphyræna argentea)* is one of the most important of Californian food fishes. It is a long, slender, spindle-shaped, sharp-snouted fish, evidently well calculated to swim rapidly. In summer it is abundant on the whole coast of California from San Francisco southward, but it is probably more abundant southward than in the neighborhood of San Francisco. During the winter it disappears from the coast of California, but is taken on the coast of Lower California. It probably migrates bodily southward, but stray individuals undoubtedly remain in the waters of southern California throughout the year, for two or three days of exceptionally fine weather invariably brings them into the market. It is likely that these stray individuals live in deep water during the winter, and come to the surface on bright days. It is quite possible, though not probable, that a great part of those disappearing descend to deeper water. The fact that they are taken only by the troll or by gill nets sufficiently explains why they should not be caught in deep water.

Their movements have been watched through an entire season at San Diego, and as these observations may be valuable to serve as a basis for comparison, they may be stated here.

During January, 1890, none were seen. During February, 1890, four were taken on the 7th, one on the 11th, and two on the 28th. All these dates were at the end of a succession of days of exceptionally fine weather. On March 1, 1890, two were taken. On March 26, 1889, a few were caught, and on the following day they were abundant and remained so, with occasional lapses, throughout the summer. At the beginning of July they were with ripe spawn.

During September few were taken, but on the 29th, 30th and 31st of October they were again abundant. On November 6th one was taken, on the 7th another, on the 15th one young one was caught with a hook in the bay, and on the 18th another young one was brought from off Point Loma. On the 16th of December, one young individual, evidently of the preceding summer's spawning, was taken in the bay, and on the 30th a large one was caught off Point Loma.

The adult never or very rarely enter the bay, but in spring the

young, those not yet a year old and measuring about a foot in length, enter the bay in large schools, and are then destroyed in quantities with seines or Chinese bag nets.

About San Diego the troll is the only means used in catching them. It is simply a piece of white rag, or, more commonly, a fragment of bone, to which a hook is lashed. One or more of these is dragged behind a boat made usually after the pattern of the Columbia River salmon boats. The amount of the catch depends largely on the wind. A slack wind, even when barracuda are abundant, brings but few fish. The largest catch reported for a single day is eleven hundred by one boat with two men. Rarely more than forty are taken. They average from six to twelve pounds, and from two and a half to four feet in length, and retail at ten cents a piece. Large numbers are salted and dried.

About Monterey they are taken with the gill net. In 1890 the first individuals reached Monterey on March 10th.

Like most of the surface and shore food fishes the barracuda feeds chiefly on the anchovy (*Stolephorus ringens*).

NOTES ON THE NATURALIZED PLANTS OF SOUTHERN CALIFORNIA. II.

BY S. B. PARISH.

The Morning Glory (*Ipomæa purpurea*) is reported in the synoptical flora from San Diego, collected by Mr. Cleveland, and Dr. Gray suggests that it may be indigenous there, a conjecture that is repeated in the Botany of California.* It is not however well-founded, the plant in the southern counties being too often a very troublesome weed in orchards, vineyards or gardens. As such it has long had a bad reputation among horticulturists, who find it nearly impossible to eradicate it from grounds in which it has once become established. It is especially troublesome in vineyards, which can only be cultivated early in the season, and where the clambering stems can easily overrun the low stocks to which the grape is pruned. Mr. Lyon tells me of a forty-acre vineyard near Los Angeles entirely ruined by this climber. In orchards it can be kept down by frequent cultivation, but it is exasperatingly persistent, as I have proved by my own experience. Some twelve years ago I

*Vol. ii, 470.

planted it for ornamental purposes, but learning its dangerous character, carefully destroyed the plant before the end of the summer. They had however scattered considerable seed and the next spring there was an abundant crop. Constant vigilance was exercised to destroy them before they could produce seed and has been exercised annually since, but every year a few vines continue to make their appearance where the first ones were planted twelve years ago. Although so persistent when once introduced it confines itself to particular localities, and does not tend to become commonly diffused, as do weeds whose seeds are better provided with facilities for transportation. In most cases where it has become a weed its origin is probably directly due to cultivation as a flower.

Of the Mustards, two species are common all through this region. Hardly a grain field is entirely free from *Brassica nigra*, and on the rich adobe lands of Los Angeles it is exceedingly luxuriant and abundant, in places taking entire possession of the soil and overtopping horse and rider. *B. campestris* is mainly a wayside weed, somewhat less common than the former species, but in my neighborhood increasing of late years. *B. adpressa* has been observed only about San Bernardino, where it is quite common by roadsides. A fourth series, *B. sinapistrum* is reported* as "sparingly naturalized in Southern California," but it has not been found, so far as I can learn, in the counties to which I have restricted that term, and is excluded from the list of our weeds.

The Fuller's Teasel *(Dipsacus Fullonum)* seems to have established itself only about San Diego. It has been collected at Los Angeles by Mr. Lyon, but as an evident escape. At San Diego Mr. Cleveland obtained it as long ago as 1876 among the stony hills of the Cajon Valley, where it is still growing, and Mr. Orcutt reports it as naturalized at the Old Mission.

San Diego being a seaport is more exposed to the invasion of foreign plants than are the inland towns, and, as might be expected, it does in fact afford a number of species not known elsewhere in the southern counties. The most interesting of these is *Sonchus tenerrimus*, for which San Diego is the only known station in the synoptical region. Collected long ago by Nuttall, who published it as an indigenous species† it escaped the notice of succeeding botanists, until recently rediscovered by Mr. Orcutt. Yet according to him it

*Bot. Cal., ii, 40. †Trans. Am. Phil. Soc. vii, 438.

is not especially rare, and it is to be found on the west side of Point Loma and at other places about the city. Two other sow-thistles, *S. asper* and *S. oleracea* are universally prevalent weeds in cultivated ground.

Cotula australis is found in the south only at San Diego, although not uncommon at the north, whence it has probably reached us. Mr. Cleveland has collected it sparingly in city yards. Its congener, *C. coronopifolia* is common everywhere, its abundant yellow discs brightening the margins of brooks and ponds.

Another common northern weed which is known here only at San Diego is the objectionable *Centaurea solstitialis*. It is reported as quite common, and is probably destined to become as universally diffused as its ally, *C. Melitensis*.

Of the Xanthiums, *X. Canadense* is a common pest, especially of pastures and the borders of highways. *X. spinosum*, the Spanish Needle, is as yet fortunately rather rare, but is to be seen here and there by the roadside and is slowly increasing. This may also be said of the handsome but most pernicious Milk Thistle, *Silybum Marianum*, so common on the San Francisco sand-hills. Ten years ago I first noticed a half-dozen of these thistles by the Southern Pacific Railway in the San Mateo cañon. Their introduction was doubtless due to the railroad. A few years later a single plant appeared near Kehls Mills, a mile south of the town of San Bernardino. The mottled foliage of the unknown waif found favor in the eyes of the owner of the adjoining land, who carefully protected it from accidental destruction "to see what it would come to." It came in a few years to occupy the most of the road, and its early protector has paid for his mistaken charity by assiduous but only partially successful efforts to eradicate it. It is as yet by no means common, but it is to be seen every year in new places and evidently has a future before it.

A thistle of still more recent introduction is *Cnicus edulis*, whose indigenous range extends from British Columbia to the bay of San Francisco, but which first appeared here in 1884. In that year a single plant was observed on Arrowhead Avenue, near San Bernardino. It is now quite common along this road for nearly a mile south of the original plant. None are to be found north of it, a circumstance due to the prevailing direction of the winds during its fruiting season. It is one of the least obnoxious of thistles, and is readily eaten by horses and cattle.

Another composite, indigenous in the Sacramento valley, I have seen in the south at a single station, and that such as to render it very probable that it was there an introduced species. This is *Hemizonia Fitchii*, and it was growing quite abundantly in a large wheat field on the Mojave river. As it is not known to occur elsewhere so far from its range it is reasonable to suppose that it owed its presence at this place to imperfectly cleaned seed wheat brought from the region in which it is native. I have not revisited the place (Burcham's Ranch) where it was observed, and am unable to give its subsequent history, but I have little doubt that it still continues to propagate itself.

The showy *Verbesina encelioides* possibly may be indigenous in the valley of the Colorado, as it is in Arizona and eastward, but at El Monte in Los Angeles county it is an abundant roadside weed and certainly not native. In the city of Los Angeles *Melampodium perfoliatum* is plentiful in damp waste grounds and along ditches. It is a Mexican species, and the extent to which it has established itself indicates that it was an early introduction. Another Mexican plant which has been long naturalized is *Bidens pilosa*, also an inhabitant of ditch sides, and not rare in the southern counties.

Mayweed, *Anthemis cotula*, which here justifies its popular name by early flowering, is now a common roadside weed in the San Bernardino valley, although a dozen years ago it was comparatively scarce.

SEBASTODES GOODEI.—This species was recently described by us in the Proceedings of the California Academy of Sciences. All of our specimens were procured at San Diego. It is of considerable interest, therefore, to find that this species is found as far north as San Francisco, where two specimens were procured on April 17, 1890. They are now in the collections of the California Academy of Sciences, and numbered 1130. CARL H. EIGENMANN.

Mr. C. G. Pringle's set for 1889 of Plantæ Mexicanæ, numbering 335 species (Nos. 1990–2600), is of the usual excellence of those issued by this best of American collectors. They have been named by Dr. Sereno Watson, who describes as new, two genera and one-fifth of the species.

NOTES ON LEPIDOPTERA.

BY JAMES BEHRENS.

On a trip to Gilroy Springs in 1862, I caught on April 5th more than a dozen specimens of that most charming butterfly, *Lycæna regia*. W. H. Edwards congratulated me on the capture, as it was the northermost station from which it had been reported. Remembering the circumstance, I felt prompted in 1887 to revisit the spot in hopes of a new catch. I reached the place near the end of March, found it cold, dreary and rainy, and such weather continued for the whole month of April. Patient waiting for nearly two weeks brought me, in a few rays of sunshine, at intervals, six specimens, and I felt greatly pleased that after twenty-five years I should find the beautiful insects at the same old spot to welcome me, and give them fame in a museum box instead of leaving them a prey to birds or "devil's darning needles," or decay under fallen leaves.

I described the exact spot later to C. F. McGlashan, of Truckee, and believe that in April he, favored by fine weather, made a remarkable haul.

In the western part of Siskiyou County, near the Sacramento River, while crossing a field at 9 o'clock in the morning, I found hundreds of Papilios feeding upon wet sand. A slap of my net brought me only seven specimens, though I had expected twenty; the others circled away without returning, and I sought them in vain the next morning at the same spot. My catch proved to be *Indra*, *Rutulus*, *Eurymedon*, *Zolicaon* and *Daunus*—five species, the whole list of our California Papilios, except the common *Philenor*, which does not occur there.

RECENT LITERATURE.

ZOOLOGY.

In the April number of the *Auk*. Mr. Frank Bolles contributes a lengthy and exceedingly interesting study of "Barred Owls in Captivity." Two young birds were taken from the nest and studied in relation to their habits, choice of food, and especially the effect upon other birds when one of the owls was exposed in wooded districts or open fields. As a magnet for a mere bird collector such a pet owl would be an important auxiliary; to Mr. Bolles the study and not the slaughter of birds seems to have been his incentive. In the

White Mountains of New Hampshire, where his observations were made, he recognized 9782 birds, representing 95 species, between July 6 and October 14.

Mr. Jonathan Dwight, Jr. publishes his study of "The Horned Larks of North America," based upon an examination of no less than 2012 specimens "and material is still wanting." How well Mr. Henshaw did his work upon this group six years ago with only 350 specimens is shown in the present paper, which leaves his results practically unchanged. Mr. Dwight describes two new races and adds one from the MS. of Mr. Chas. H. Townsend as follows:

Otocoris alpestris adusta Dwight. Scorched Horned Lark. Hab. Southern Arizona and New Mexico, Western Texas and southward into Mexico.

Otocoris alpestris merrilli Dwight. Dusky Horned Lark. Hab. Eastern Oregon, Washington and British Columbia, between Cascade and Rocky Mountains; southward in winter into Nevada and California.

Otocoris alpestris pallida Townsend, MS. Hab. Lower California and Sonora.

The paper concludes with a key to the horned larks in all plumages and a map of North America indicating the range of the eleven known forms.

Mr. F. Stephens has described a new vireo from Southern California, *Vireo vicinior californicus*, California Gray Vireo, but fails to designate type specimens or define closely the habitat of the new form. Such neglects in the past have occasioned inconveniences and errors, and should be studiously avoided. W. E. B.

Report on the Explorations made during 1888 in the Alleghany Region of Virginia, North Carolina, and Tennessee, and in Western Indiana, with an account of the Fishes found in each of the River Basins of those Regions. By DAVID STARR JORDAN. Extract. Bull. U. S. Fish Comm., vol. viii, for 1888. Washington, 1889. Dr. Jordan had the assistance of several of his former students in ichthyology in making these explorations which, as he states, were made for two general purposes: First, to ascertain the general character of the streams in question, their present stock of food-fishes and their suitability for the introduction of other species; second, to catalogue the fishes native to each stream in order to

complete our knowledge of the geographical distribution of each species, and to throw light on the laws which govern geographical distribution. In his general conclusions Dr. Jordan says "Additional confirmation has been given to the idea that the lowland swamp fishes of the United States are remains of an earlier and, in fact, now extinct fauna. * * * The upland fishes seem to be mostly of more recent origin, the species of Notropis and Etheostoma probably latest of all." The following summer was spent in making similar explorations in the remaining states as far west as Colorado and the Yellowstone Park. The result of these last have not yet been published. It is to be hoped that the Pacific Slope may be as well explored at an early day. R. S. E.

Description of a New Cottoid Fish collected by the U. S. Fish Commission. By TARLETON H. BEAN, Ichthyologist; U. S. Fish Commission. Proc. Nat. Mus., vol. xii, No. 787, advance sheet, March 4, 1890.

In this paper Dr. Bean describes the new species and new genus *Synchirus gilli* which constitutes the new subfamily Synchirinæ. The most distinctive features are the pectoral fins completely united around the breast, having all the rays supported by actinosts, and the remote, though thoracic, ventral fins. R. S. E.

BOTANY.

Neue Arten von Nyctagineen. Engler's Botanische Jahrbuch, xi, 84–91, t. ii, by Dr. A. Heimerl. Among the new species Dr. Heimerl describes *Mirabilis Watsoni* from Guatemala, *Berberis gracillima* from Mexico, collected by Hartweg, and again in 1885 by Pringle (No. 665), and *Abronia pogonantha* collected by Parish (No. 1345) "on the sandy banks of the Mojave River."

Garden and Forest, No. 109.—A newly imported Rose Saw-Fly (*Emphytus cinctus*) J. G. Jack. New or Little Known Plants (*Aster ptarmicoides*) with figure. No. 110.—Sports, by M. T. Masters. New or Little Known Plants (*Syringa Pekinensis*) with plate. No. 111.—Exotic Palms in Florida, by Theodore L. Mead. New or Little Known Plants (*Lycoris squamigera*) with plate. No. 112.—Notes on North American Trees, xvi; A Question of Nomenclature, by C. S. Sargent. Plant Notes; Two American Honeysuckles, (*Lonicera flava*, *Lonicera Sullivantii*) with plates, by C. S. Sargent.

Botanical Gazette, Febr. Undescribed Plants from Guatemala, vii, (*Oxalis dimidiata*, *Hanburia parviflora*, *Styrax Guatemalense*, *Solanum olivæforme*, *Campanea picturata*, *Carpinus Americanus*, var. *tropicalis*, *Tradescantia subscaposa*, *Nephrodium duale*, with pl. iii, iv.) by John Donnell Smith. A Revision of North American Cornaceæ, i (*Cornus Baileyi* and *C. Greenei* n. sp.) New Mosses of North America, iii (*Dicranella Langloisii*, *Dicranum consobrinum*, *Didymodon Hendersoni*, *Grimmia tenerrima*, *Coscinodon Renauldi*, *Orthotrichum Hendersoni*, *Orthotrichum ulotæforme*, *Bryum Hendersoni*) by F. Renauld and J. Cardot.

Bull. Torr. Club, March. An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, xi (*Tibouchina Rusbyi*, *T. Brittoniana*, *T. lanceolata*, *T. stenophylla*, *T. purpurascens*, *T. octopetala*, *Axinæa speciosa*, *Meriania Boliviensis*, *Leandra stellulata*, *Miconia persicariæfolia*, *M. multiflora*, all named by Cogniaux,) by N. L. Britton. The Carices of the Upper Half of the Keweenaw Peninsula, Carex Notes xiii, by L. H. Bailey. Pinus Banksiana at the West, by E. J. Hill.

PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *March 3, 1890.* President Harkness in the chair.

Dr. C. H. Eigenmann read a paper on "Some Features of the Freshwater Fauna of South America," in which the following points were brought out:

First—The great extent of the South American freshwater fauna as compared with that of other continents, there being 126 species of freshwater fishes in Europe, 600 in North America, and 1200 in South America.

Second—The relation of the fauna to that of other continents. All but two of the genera, exclusive of marine forms entering rivers, are peculiar to South America, and no species of fish is common to tropical America, and any other continent. The fauna is much more nearly related to the African than to that of North America.

Third—The origin of the fauna is but very remotely connected with other faunas, and with the exception of the Dipnoi and certain other old forms, the genera, and at least ten of the families, are autochthons.

Fourth—All the genera were grouped according to their distribution, and it was found that the number of species of any genus varied directly as the extent of its distribution. The Brazilian subregion was divided into the following provinces: 1, Pacific; 2, Andean; 3, Colombian; 4, Orinocan; 5, Guianan; 6, Amazonan; 7, San Franciscan; 8, Atlantic; 9, La Platan.

Dr. Carrington Bolton, of the New York Academy of Sciences, was present at the meeting, being on his way to the Hawaiian Islands to visit the "singing sands" found there. He gave a very interesting account of a recent visit to a hill of sonorous sand in Arabia.

Professor Ward, of Rochester, who had visited the same hill more than thirty years before, gave an accouut of his experiences during the journey, which was then much more difficult, and corroborated Dr. Bolton's report of the form of the hill and the sound produced by movement.

Professor Ward afterward described a recent voyage around South America, and told in graphic words the story of his trip down the western side of the continent.

From latitude 42° south, opposite the Island of Chiloe, there extends along the coast for more than a thousand miles an inland passage navigable for small vessels the entire distance, but in places too tortuous and narrow for large ones. He described the natives of the southern western coast as a miserable, naked and degraded race, and gave some amusing instances of their apparent indifference to cold.

April 20, 1890. President Harkness in the chair.

Some specimens of *Coprinus* of extraordinary size presented by Mr. C. H. Clark were exhibited. They were found growing under brandy casks in the storage cellar of Mr. Kohler's winery near Glen Ellen. The largest was over six inches in breadth, with a stipe an inch in diameter, and sixteen inches in length.

Dr. Harkness made some remarks explaining the place of the plant in classification, and its usefulness as food.

Mr. C. H. Eigenmann spoke of some fishes collected near the mouth of the Sacramento River calling especial attention to the young of the quinnat salmon of which a number were procured, and the young of the smelt, *Osmerus thaleichthys*. He also called attention to the large number of species of Scopelidæ recently added to the Californian fauna. Six new species were found in the neighborhood of San Diego. All these possess phosphorescent organs. They were all obtained from the stomachs of rock cod in stormy weather. During calm weather they do not get in the reach of rock cod, probably living nearer the surface.

San Francisco Microscopical Society. *April 9, 1890.* President Wickson in the chair.

The President read a communication from Dr. Sydney J. Hickson, of England, regretting that he was not able from lack of time to meet with the society and give them a short account of his studies on coral reefs.

Dr. Henry Ferrer briefly addressed the society on the motility of the color cells of the eye.

Mr. Riedy exhibited a new American concentric stand recently made for the Secretary by the Bausch & Lomb Company, which showed several new and very desirable improvements.

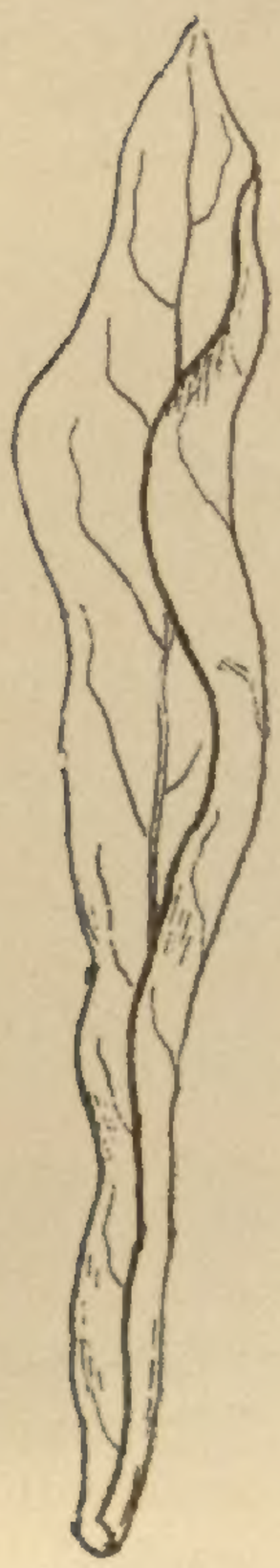
April 23, 1890. President Wickson in the chair.

A communication was read from Professor Hanks stating that the society having been organized June 4, 1870, would on the next anniversary be twenty years old. The President thereupon appointed a committee of arrangements to make the occasion one of special interest.

A communication on the use of carbon made from the down of the milkweed, as a flash light for photography, was read by the Secretary.

Professor E. W. Runyon exhibited a fine series of micro-photographs, and explained in detail his method of procedure.

PLATE I.



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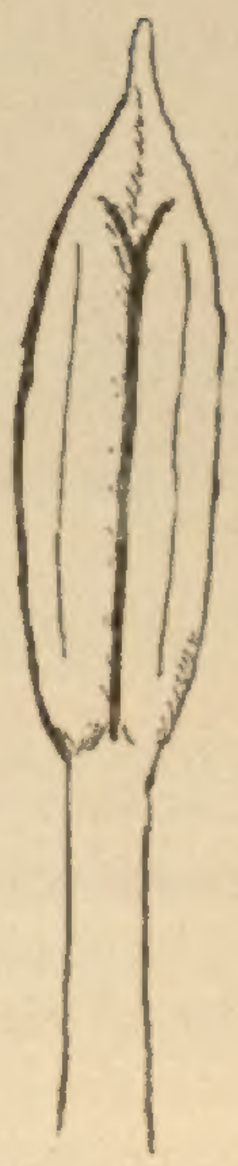

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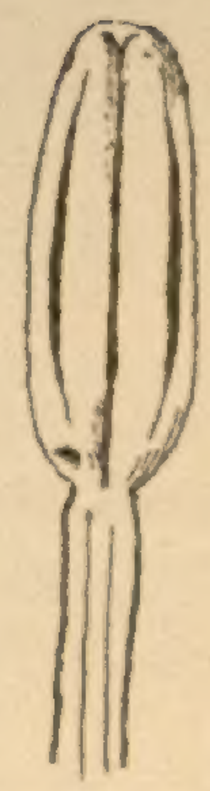

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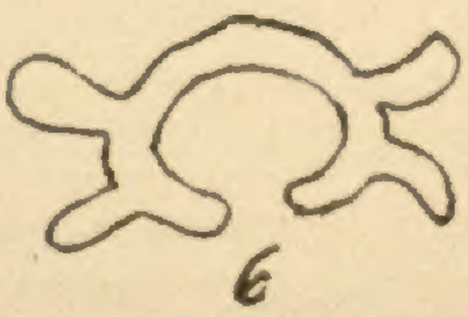

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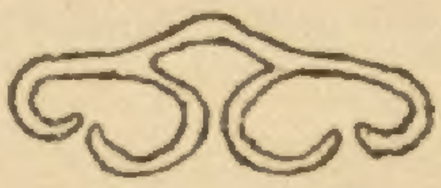

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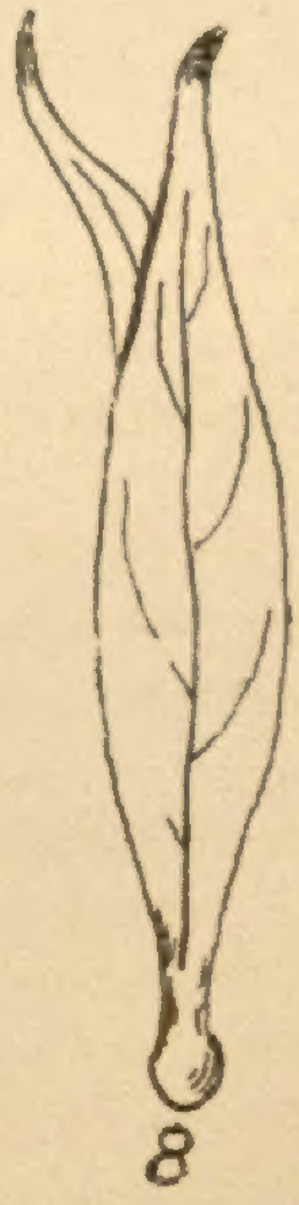

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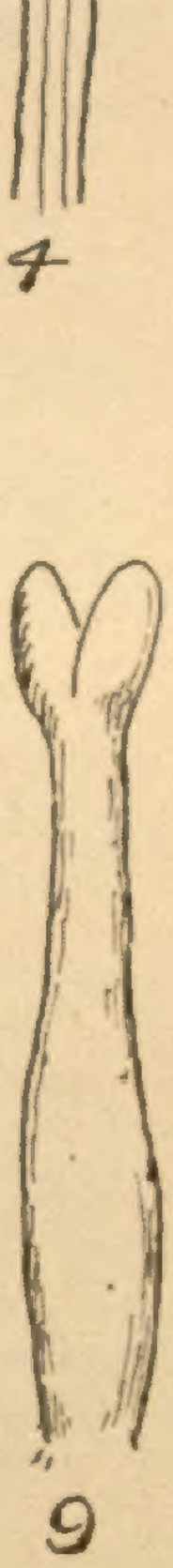

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